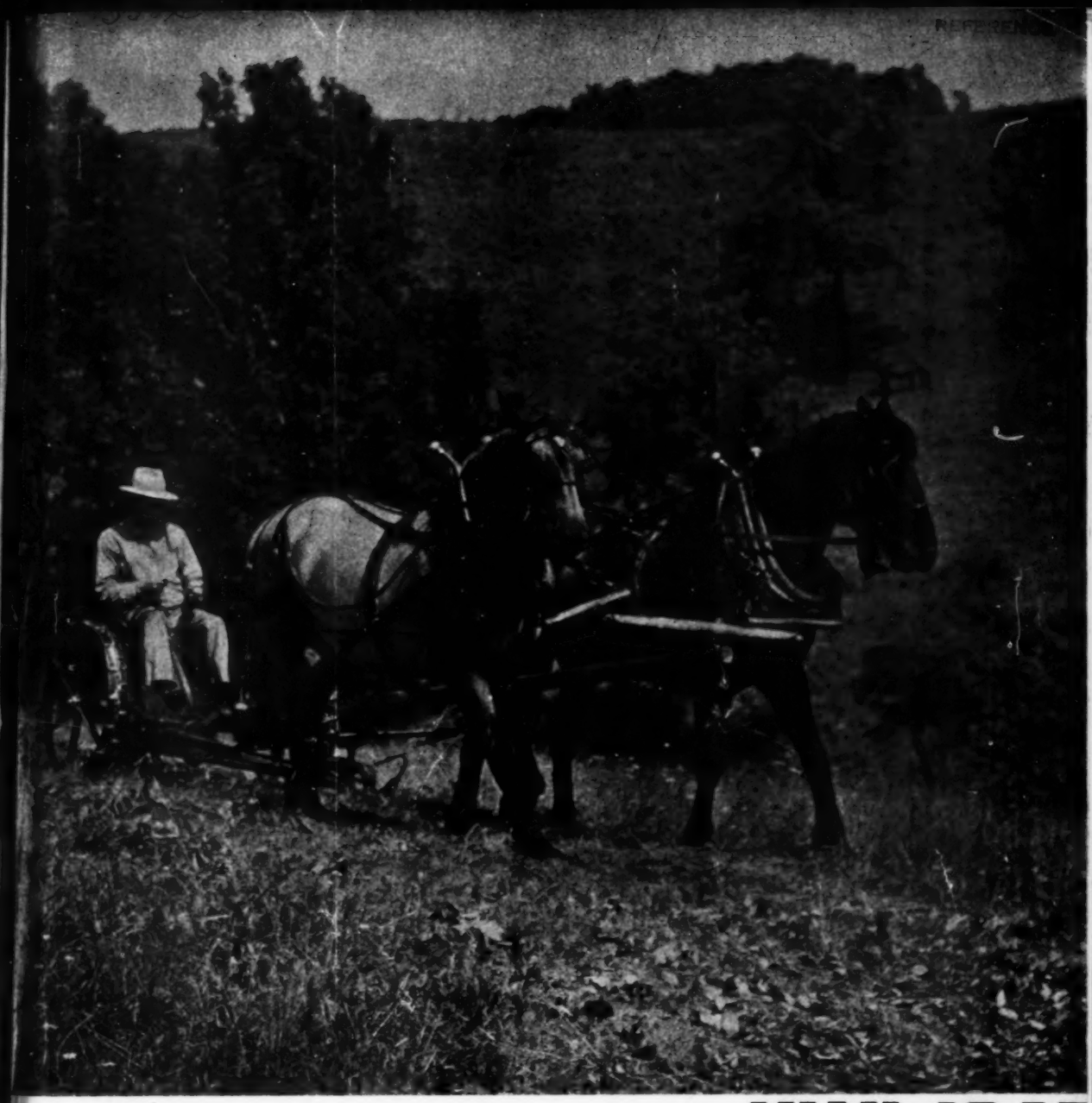

JULY 1945

SOIL CONSERVATION

OFFICIAL ORGAN OF THE SOIL CONSERVATION SERVICE

NITED STATES DEPARTMENT OF AGRICULTURE, WASHINGTON, D. C

SOIL CONSERVATION

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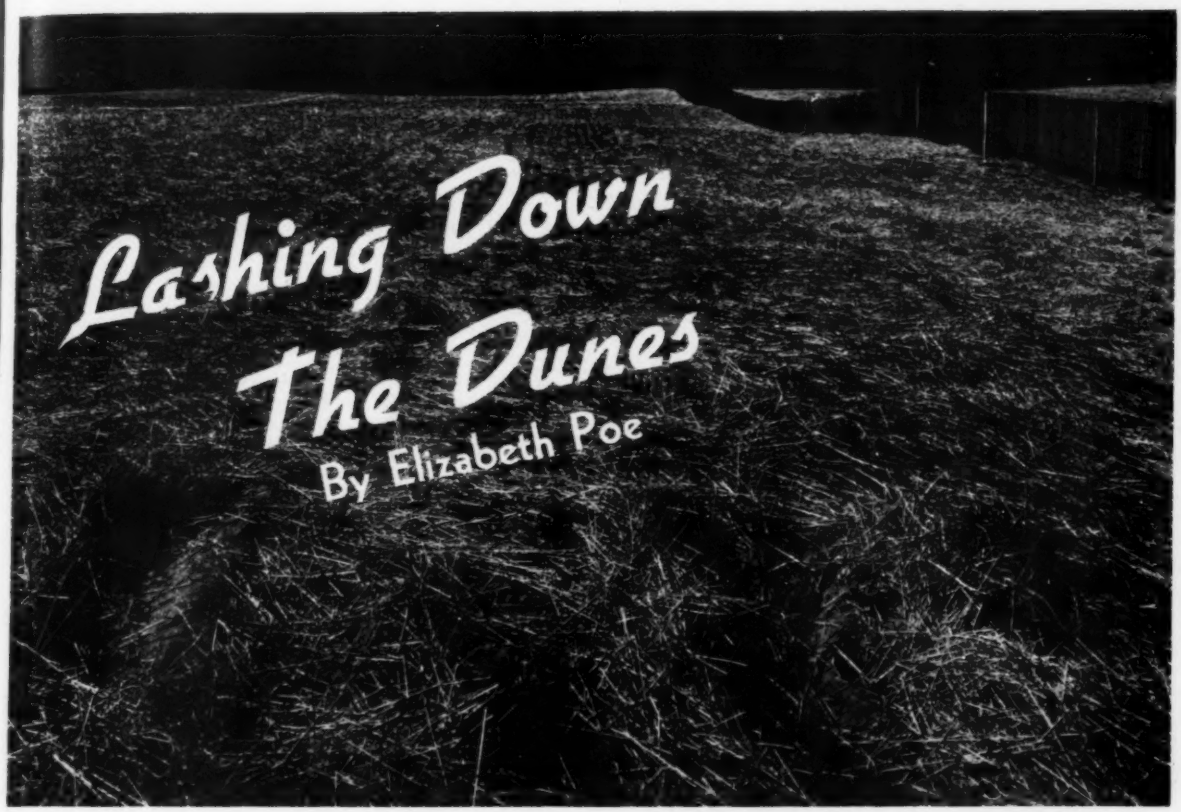
WELLINGTON BRINK EDITOR

CONTENTS

Front Cover: Scene from one-reel motion picture, "Your Soil Conservation District." Bruce Linger, Skin Creek, Lewis County, W. Va., mowing as part of pasture improvement program. Photographer: Hermann Postlethwaite.

SOIL CONSERVATION *is issued monthly by* SOIL CONSERVATION SERVICE of the United States Department of Agriculture, Washington, D. C. The matter contained herein is published by direction of the Secretary of Agriculture as administrative information required for proper transaction of the public business, with the approval of the Director of the Budget. SOIL CONSERVATION seeks to supply to workers of the Department of Agriculture engaged in soil conservation activities, information of special help to them in the performance of their duties. Copies may be obtained from the Superintendent of Documents, Government Printing Office, Washington 25, D. C., 10 cents a copy, or by subscription at the rate of $1.00 per year, domestic; $1.50 per year, foreign. Postage stamps, will not be accepted in payment.



Rye was planted on this leveled sand dune area before the straw was applied. The rye grew up through the straw. A snow and windbreak fence at the right aided the revegetation.

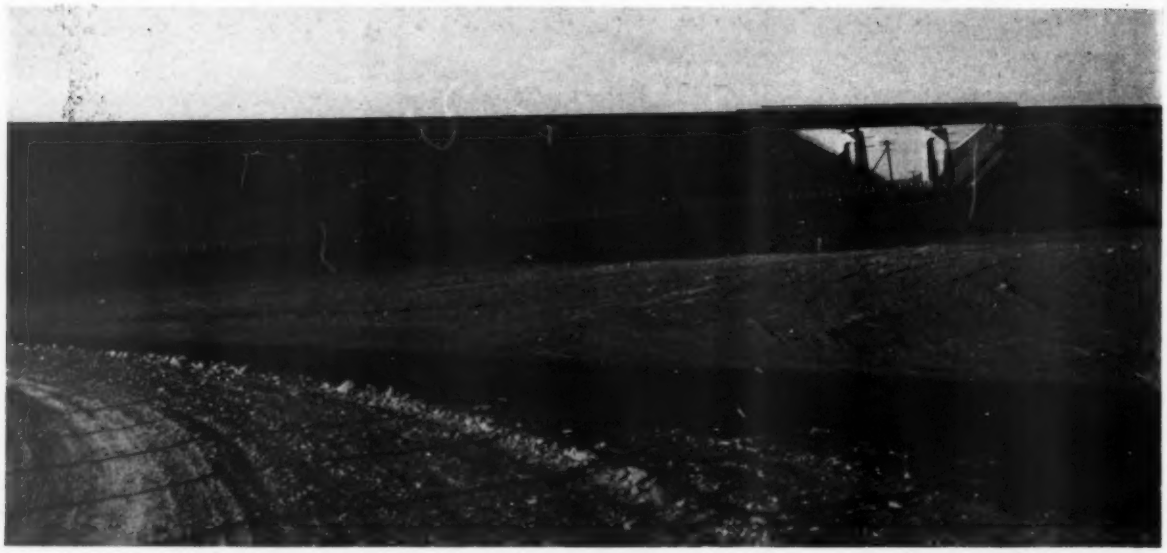
To stabilize a 20-mile stretch of railroad bed in southern Colorado 800 acres of shifting sand dunes were leveled, seeded to grass, and lashed down with straw. By thus winning the war against the wind the Soil Conservation Service saved taxpayers as much as $2,000,000.

Conquering this troublesome blowsand area became a necessity in 1936. Congress had passed a flood control and water conservation act authorizing the construction of the John Martin Reservoir on the Arkansas River in Bent County, near Caddoa, Colo. The main line of a railroad, between Lamar and Las Animas, Colorado, ran within the reservoir area laid out for the dam. It had to be moved. There were two routes that the new track could take. One was through the fertile, irrigated valley north of the Arkansas River—a route that would have ruined thousands of acres of food-producing land and have involved a large expense for right-of-way, bridge and grade crossings. The route finally selected involved an area of sandy, dry, grazing land—a local patch of Sahara country that wasn't then of much use to anybody.

Railroad officials knew that the shifting sands of the area would be a permanent cost and constant menace to the safety of speeding trains. U. S. Army Engineers in charge of constructing the dam were confronted with this problem of safely relocating the tracks, and this had to be done at government expense.

The engineers sought a solution. Down in the Texas Panhandle and in other parts of the so-called "dust bowl" technicians of the Soil Conservation Service were making headway against similar sand dunes. The problem was taken to these soil scientists. They agreed that the job of tying down the dunes would be difficult, especially in view of the need for speed, but they were willing to make the attempt, and the railroad engineers felt that if the dunes could be stabilized, every-

EDITOR'S NOTE.—The author is head of the current information section, Division of Information, Soil Conservation Service, Albuquerque, N. M.



Strong winds were cutting away this main-line fill. Grass eliminated the hazard.

Clifton L. Etter, Soil Conservation Service technician, was in charge of stabilization job. Grass taller than his head now grows on once-barren sand area.

thing would be ready for relocation of the railroad.

Clifton L. Etter, experienced sand dune stabilizer with the Soil Conservation Service, was handed the assignment. He was given only two growing seasons to complete it.

Etter knew that the only way to reclaim the dunes was to hold them down. This meant trying to get a solid cover of something to hold the shifting sand—grass preferably. He began work June, 1939. The dunes were leveled with bulldozers, and sand-loving grasses known to be effective against wind were planted on a representative dune area of about 125 acres. This didn't work. The sweeping action of wind-driven sand destroyed the young plants before they got established,—under the handicap of only nine inches of rainfall.

It was then decided to cover the land with a mulch material—wheatstraw—to hold the sand in place. Again grass was planted. This time it was covered with straw. The straw was tucked into the sand with roller equipment. Soon grass began to shoot up through the straw.

After the dunes were leveled, the land was seeded with a double colter disc-type drill to a mixture of adapted grasses. This mixture—23 pounds to the acre—consisted for most part of sand drop seed (*Sprobolus Cryptandrus*), blue grama (*Bouteloua Gracilis*), side oats grama (*Boutelous Curtipendula*), and blowout grass (*Redfieldia Flexuosa*). Next, local farmers who had contracted to bring the straw began hauling it to the site in trucks. The trucks had to be pulled through the dunes by tractors, and the straw was dumped in

One of the 22 dunes stabilized in southeastern Colorado.

Crawler-type tractor pulls three trucks loaded with wheat straw onto sandy area. Straw was rolled into sand, served to check blowing while grass took root.

windrows. A crew of men with pitchforks followed to do the spreading.

The straw was applied as uniformly as possible to a depth of approximately two inches, which required from five to seven tons per acre to get satisfactory coverage. Tucking the straw into the loose sand was an important operation. If the straw hadn't been rolled immediately after application, the wind would have taken it up, leaving exposed sand which would require reworking to maintain uniform coverage.

Observation indicated that the effective life of

Santa Fe train speeds through what once was wasteland.

mulch in controlling soil blowing was about three growing seasons. According to Etter, this is an advantage in favor of mulch as a cover in this area, since the ultimate aim was to re-establish a permanent vegetative cover that would control wind erosion. When mulch is used instead of a growing crop for cover, soil moisture is not depleted, but is available for grass seedlings. Fair to excellent stands of grass were obtained on some of the mulched areas, Etter says, and the seedlings of some species became well enough established to produce a light crop of seed the first growing season.

The excavation for the new railroad bed through the active sand dunes started in October, 1939. This left borrow pits on either side of the fill that averaged about 75 feet in width. Altogether about seventy-five acres of freshly exposed sand presented yet another hazard. Seeding, straw spreading and rolling operations were started on these areas as soon as construction of the roadbed was completed. The steep sides of fills and cuts presented another problem. The roller slid and bunched the straw. By rolling the slopes at an angle they were handled satisfactorily.

Another area that required special treatment was about 700 acres of sage land on both sides of the right-of-way. This was seeded to grass in an attempt to increase the density of the natural vegetation, which had been thinned by drought and overgrazing. In March, 1940, this land was seeded to a mixture of blue grama, side oats grama, Indian rice grass, sand drop seed, and Canada wildrye. A fair initial stand was obtained from this seeding, but with competition from old established plants and weeds, the stand decreased considerably before the end of the growing season. Removing the livestock from the land saved it, however, and the plants and weeds and grasses achieved a new vigor.

In other parts of the area trees and shrubs were planted as shelterbelts to break the speed of the wind. More than 29,000 cottonwood and tamarisk seedlings were planted on a mulched portion of a dune area in March, 1940. The trees and shrubs were taken from the river bottom, only a short distance away, and were planted in rows 11 feet apart running east and west, with the species alternated and spaced 4 feet apart in the row. About 77 per cent of the seedlings survived the first growing season.

The total unit cost per acre for stabilizing the dune areas, including leveling, mulching, and seeding native grass, was $79, (the average cost of mulching alone per acre was $46.64.) The cost of this entire job of stabilization was $131,250. Pretty good public business, one might say.

DISTRICT PROFILE

SOUTH CAROLINA'S McARTHUR

Mention the name of McArthur among farmers of South Carolinia and chances are they will ask, "Which one do you mean—E. C. or the general who's fighting the Japs?"

This is a story about E. C. McArthur. Gaffney, S. C., lays claim to him, but that doesn't mean you are likely to find him there. As president of the South Carolina Association of Soil Conservation District Supervisors, McArthur spends considerable time in various parts of the state, urging farmers to give soil erosion a knock-out blow—once and for all.

Soil conservation is Ed McArthur's religion. He knows the history of agriculture in this country from Washington's day, and he knows the interest Washington and Jefferson had in making a better agriculture for this country. **For years, he has carried on a battle against erosion in his own Cherokee County, and, too often, he has felt that he was alone in his fight to save the precious soil that was so fast being washed down to the sea. He worried over barren hillsides and steep slopes and the streams that ran red with the life blood of the land.**

In preparation for his duties as soil conservation district supervisor, Ed read the districts law. He also read the Secretary of Agriculture's statement and found what he believed to be the answer to the farmer's problem. To him, a soil conservation district, OF farmers, BY farmers, FOR farmers, seemed the most democratic way of operating, according to the belief that the masses of the people are capable of governing themselves.

To save the soil was an obsession with Ed McArthur. He accepted it as his mission. Furthermore, he realized the need for haste. He realized that our soil was fast washing away.

"There's not much sense shouting something about protecting our land when we let it wash right out from under our feet," McArthur declares. "Back in the old days we tried to lick erosion in a hit or miss fashion, but we don't have to guess any more, especially if we follow a complete soil conservation plan on our farms. Such a plan puts every acre to its best use and sets up the conservation methods that will control erosion and keep the land productive."

E. C. McArthur

If you observe McArthur at work on his own 165-acre farm in Cherokee, or carrying out his duties as supervisor of his own Broad River Soil Conservation District, or busy in his leadership of the state association of soil conservation district supervisors, you soon will recognize that he is carrying out his slogan, "Plan your work and work your plan."

McArthur never starts anything until he has a plan. Then he carries it out vigorously and effectively. Here's an example:

A survey made with the assistance of the Soil Conservation Service showed that the three counties of the Broad River Soil Conservation District had the staggering total of 98,000 acres of steep, eroded, idle land which was bringing in no return

to the farmers but was costing them as much per acre in taxes as their best cropland.

With this startling information before them, McArthur and the other supervisors called in representatives of various agricultural agencies in the district. Together they laid comprehensive plans to get this land back into profitable production through the planting of sericea lespedeza and kudzu.

By the end of the first planting season, nearly 4,000 acres of kudzu and sericea had been established on 600 farms in the three counties of the district. The program is continuing and in 1945 the supervisors ordered a half million kudzu crowns and made them available at cost to farmers, in addition to those which farmers obtained from other sources.

McArthur will back up any idea which he feels will advance soil conservation in his state. Last year a fellow district supervisor, J. B. Douthit, of the Upper Savannah District, suggested that the state association of district supervisors conduct an essay contest on soil conservation for school children. McArthur persuaded the South Carolina Bankers' Association to sponsor the contest in cooperation with the district supervisors' association. So well was the plan made and carried out that 4,832 essays were entered.

Another McArthur achievement is that South Carolina most likely leads all other states in the number of newspaper advertisements on soil conservation. He doesn't claim credit for all the advertisements that have appeared and are still appearing. But he did interest one banker in running a series of soil conservation advertisements, after which McArthur helped to sell the idea to supervisors of other districts in the state.

As a grass-roots soil conservationist and supervisor of the Broad River District since its organization six years ago, McArthur practices what he preaches. On his own farm he is carrying out a complete soil and water conservation program. For the first time, he says, he is not only controlling erosion but also has considerably increased the per-acre yields of all his crops. **Three years ago he won first prize of $750 over 531 other contestants in the South Carolina cotton improvement contest sponsored by Clemson College Extension Service and commercial firms. He produced 5,700 pounds of lint cotton on a 5-acre demonstration plot. As a result of the increased feed produced through better land use and improved rotations, McArthur has added a herd of 32 registered Hereford cattle and is following a well-rounded farm program that puts every acre of his farm to the use for which it is best adapted.**

But McArthur's interest in soil conservation is not limited to his own farm, community, district, or state bounds. At his own expense, because he received no salary either as district supervisor or as president of the state association of supervisors, McArthur has traveled through most of the South in the interest of soil conservation and has appeared on a national meeting of the Friends of the Land in Chicago. He preaches soil conservation with all the fervor of an old-time evangelist, picturing the hell-fire and damnation of erosion on one side and the promised land of soil conservation on the other, with no middle ground.

And he visualizes the soil conservation district movement as a manifestation of democracy at work on the land. Here's the way he expressed this philosophy in the last annual report of the Broad River Soil Conservation District:

"We want our people, down to the last pupil in a one-teacher school, to know that soil conservation districts and the districts law have a deep meaning and a deeper influence that can be readily understood by those of us who believe in a democracy which allows the people to run the government, instead of the government's running the people; for soil conservation districts are created by the people for the help they can be to people, and they are managed by the people themselves. Whatever the objective of any movement may be, the safety of a nation lies not in the hands of the few but in the hands of a people who believe in the democratic idea that the masses are capable of governing themselves, and who enter into the affairs of government and accept their responsibilities to participate as a God-given right. Such is the philosophy of the Soil Conservation District Law."

—Ellen S. Cobb.

WHY DISTRICTS SUCCEED

Eight primary reasons for the remarkable success of soil conservation districts were advanced recently by Dr. H. H. Bennett, chief of the Soil Conservation Service. These farmer organizations are making headway, he pointed out, largely because—

1. They are typically American, in that they provide a means for mutual action toward common objectives as determined by the majority.

(*Continued on page* 15)

It's an Ill Wind

By R. R. HUMPHREY

A spring Chinook wind literally blew a soil conservation program into George and Edna Davis' 1,750-acre ranch near Malott in Washington's oversized Okanogan County.

That was back in 1937. Runoff water from snow suddenly melted by the warm wind, and from rain, washed tons and tons of soil off the slope behind their house and deposited it on the more gently sloping lands below. It was not easy then for them to think of the calamity, as it surely was, as a good omen for the future, or to foresee such good things to come of it as profitable forage production on the offending benchland above and a 75 percent increase in the carrying capacity of the Davis range.

The Davises, though, always have looked upon land ownership and land use as a temporary stewardship over a heritage that is not theirs to

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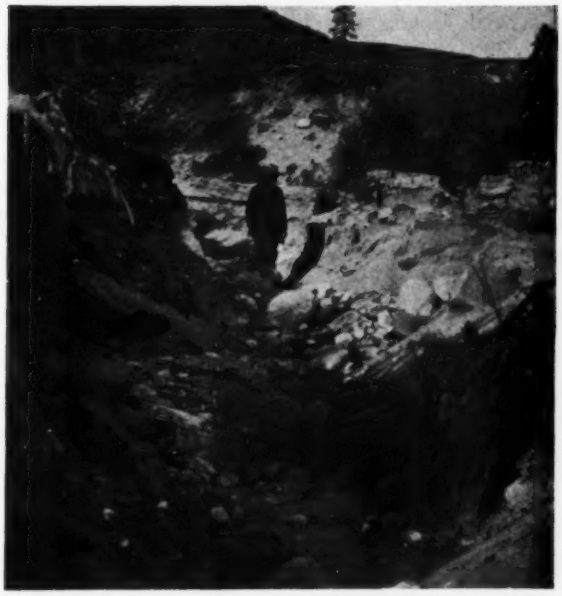
EDITOR'S NOTE.—The author is range conservationist, Soil Conservation Service, Wenatchee, Wash.



This gully was caused largely by 1945 spring runoff below untreated benchland.

To control runoff and erosion, contour furrows were constructed and the area was seeded to perennial grasses and sweetclover. These measures were highly effective.

destroy. When their farm started to erode, it was natural, then, that they turn to Vernon Chapman, county agent, to see what, if anything, could be done. Chapman, who had been advocating soil conservation locally for several years, was glad to help out, and enlisted the aid of the Soil Conservation Service.

By the next spring, and with the help of a nearby CCC camp, a conservation plan was developed for the farm. The benchlands where the water originated were contour furrowed and seeded to a mixture of crested wheatgrass, bulbous bluegrass and sweetclover.

Grasshoppers took out the sweetclover at the end of the third year, but the grasses thrived and have furnished a large amount of feed every year since they became established. Runoff has been reduced to a minimum from the area, but has continued unabated from portions of the beach that never have been treated. Although a small amount of maintenance still is necessary to make these furrows fully effective, Davis says they never have needed any major repair or rebuilding—they were built.

Quoting Davis: "To me it proves, without a doubt, there should be thousands of acres contour furrowed in the county."

Certain it is that this combination of contour furrowing and seeding to perennial grasses not only has been highly effective in controlling erosion, but has provided a dependable supply of choice forage for livestock. Just how choice is indicated by Davis' account of the behavior of a bunch of purebred Herefords that grazed his range last spring. They first were turned out, he said on a field of rye that they pretty well cleaned up before looking around for more feed. About half a mile away, they located the crested wheatgrass-bulbous bluegrass seeding and next to it about a section of excellent native range. Not until the crested wheatgrass was largely gone did they begin to drift up to the native range.

During the hard rains of early February this year, when heavy runoff and flooding were rather general in central Washington, Davis said this flat with the contour furrows lost almost no water. His observation is borne out by the fact that erosion in the drainageway below was negligible, and the little washing that did occur came from water originating below the treated area.

Adjoining the contour-furrowed benchland lies a second bench of about the same size that has been neither furrowed nor seeded. Davis reported

George Davis examining one of the numerous "plugs" built across furrows. Note the good cover of perennial grasses.

runoff from this area is heavy almost every spring (as it was from the adjoining bench before treating). Again, the drainage below furnishes proof. A gully from one to two hundred yards long, 3 to 5 feet deep, and 5 to 10 feet across, washed out this spring (1945) and piled sand and rocks on the farmland and highway below.

By stocking conservatively and consistently deferring portions of his range until the grass seed matures, Davis has built up over the years some of the finest bunchgrass range in Okanogan County. This covers a lot of ground, when one considers that the county is the largest in the state, with an area of 5,221 square miles, or almost twice the size of the state of Delaware. The application of these practices, Davis says, has increased the carrying capacity of his range at least 75 percent.

This increase, though gratifying enough of itself, tells still another story. It indicates that even before he started his formal Soil Conservation program, Davis had been a conservationist; for his range today is producing two to three times the forage of the average range adjacent to his own.

In 1932 the Davises set out three acres of bottomland to peaches, that are irrigated by water from a spring. Although these three acres use all the water the present irrigation system will pick up, a recent estimate by Soil Conservation Service

(*Continued on page* 20)

IOWA'S UNIQUE BRO-FALFA CLUB

By WALTER W. JOHN

Georgia has its kudzu and Kentucky its bluegrass, but Iowa has hitched up a grass-legume team that is winning honors in the Corn Belt. The team consists of alfalfa, long a favorite hay crop and soil builder, and bromegrass, which has won a sound reputation in a short time.

Farmers in Shelby County, Iowa, think so much of this combination that they have organized to promote it. Bro-falfa Club is the name they selected. At their first annual banquet last February more than 200 farmers and other agricultural leaders came together to celebrate the club's founding.

Credit for developing initial interest in a bromegrass-alfalfa mixture is due Maurice Heath, manager of the Soil Conservation Service nursery in Ames; Walt Weiss, district conservationist at Harlan; and the Shelby County Soil Conservation District commissioners. The plan of soil conservation districts to distribute seed of newly developed bromegrass strains has been an important factor in expanding the acreage of this soil-saving team in western Iowa.

"From an old yellow scene to a blanket of green" is the slogan. It was suggested by a member who has seen the reconversion worked on eroded cropland by this grass-legume mixture. One of the other "punch" lines that have been used to describe it is: "If you want your farm to last, rotate it with alfalfa-bromegrass."

The stamp of royalty was placed on this pair with a mock wedding of King Brome and Princess Alfalfa at the Bro-falfa Club banquet. Toastmaster Nels G. Kraschel, former governor of Iowa, and now governor of the Farm Credit Administration at Omaha, classed it as "the most fruitful wedding we may ever see." Kraschel is a Shelby County farmer and one of the first-year directors of the club, all of whom were reelected for a second term.

Principal speaker was Feng Chao-lin, a Chinese graduate student at Iowa State College. He contrasted the benefits of grassland farming with the dangers of a *grassless* agriculture such as China's. Mr. Feng was one of the Chinese students who accompanied Dr. W. C. Lowdermilk on a 6,000-mile trip through China in 1943 to study erosion problems and control methods. Telling his audience that the soil of western Iowa is quite similar to China's original wind-blown soil, he warned, "Let's start early and think about our land; China started late."

Shelby County farmers believe they have the answer to much of their soil conservation problem in bromegrass and alfalfa. Farmers in several other counties have been using this combination and are contemplating the organization of other Bro-falfa Clubs. Shelby County conservation problems are quite typical of 20 other counties in the western-Iowa-Missouri loess area.

Main purpose of this first Bro-falfa Club is to acquaint farmers with the advantages of growing bromegrass and alfalfa in combination, and with the importance of using only adapted strains of bromegrass seed.

Achenback, Fischer, and Lincoln (southern types) are the only strains of bromegrass that have the blessing of the club for Shelby County. Anyone trying to sell a club member any other strain is likely to have an argument on his hands. Members not only watch for the right strain but they also make sure that it carries the proper red or blue tag to indicate that it is certified.

Eligibility rules require that a member must own or operate farm land, must have used adapted bromegrass seed or have a stand of an adapted strain, and must use bromegrass in two or more ways such as rotation pasture, rotation hay, seed production, waterways, or buffer strips.

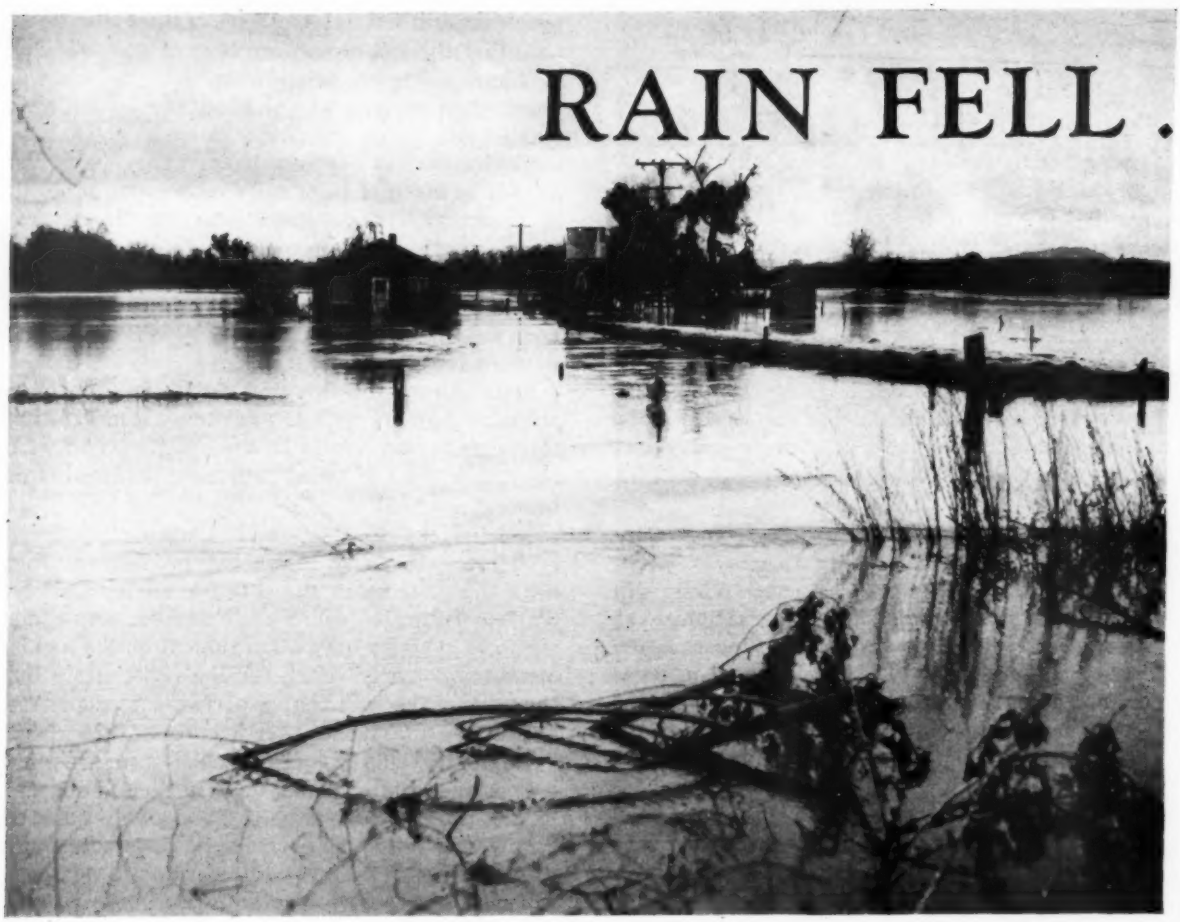
One goal of the club is to have bromegrass-alfalfa seeded on nearly 150,000 acres of Shelby County land with 50,000 acres seeded annually. This acreage includes permanent pasture, permanent hay, and cropland in rotation in land capability classes II, III, IV, and VI.

Shelby County Bro-falfa Club members are confident that the bromegrass-alfalfa team will bring them the following benefits:

1. More and better pasture and roughage.
2. Higher crop yields.
3. Maximum protection to sloping land.
4. More efficient livestock production.
   a. By using livestock to harvest the crop.
   b. By providing highly nutritious forage.
   c. By reducing labor and machinery costs.
   d. By improving livestock sanitation.
   e. By reducing corn needed per animal unit.
5. Lower seed costs.
6. Better control of weeds.

EDITOR'S NOTE.—The author is head, regional section of education, division of information, Soil Conservation Service, Milwaukee, Wis.

RAIN FELL . . .



Farms and highways were badly hit by the flood. Scenes like this may be seen almost every year in some parts of the San Joaquin Valley.

There have been harder rains and worse floods in the San Joaquin Valley than the storm of February first to third, 1945. It wasn't a "barranca storm" but it will serve as an example of the general problem. As a matter of fact, this semi-arid but fabulously productive southern half of California's famous Great Central Valley has so many floods and torrents of various sizes and degrees of destructiveness that its residents have come to accept them almost as necessary annoyances. And life being as satisfactory as it is in California, surely such annoyances can be borne without complaint.

Perhaps that is one reason that the cause and control of these floods have not been studied so thoroughly as in many other areas. It is known, however, (and the author wishes to make the point clear) that most of the floods are *not* caused primarily by the way the land is used and no conceivable changes in land use would, in themselves, entirely eliminate or control floods.

On the other hand, it has not been demonstrated that the principles (so often illustrated in *Soil Conservation* magazine) that govern the infiltration of rainfall into the ground, and the effects of soil structure, plant cover and land management practices on this infiltration, are different in the San Joaquin Valley than elsewhere throughout the world.

Undoubtedly the history of floods and torrents in the valley is as old as the mountains themselves. But a factor in the present problem is the early grazing history of the area. Wild herds of horses numbering many thousands were noted almost

EDITOR'S NOTE.—The author is district conservationist, Soil Conservation Service, Merced, Cal.

. . . in the San Joaquin Valley

By Floyd L. Otter

Main Street, February 2, 1945. Visalia's business property suffered a million dollars in damage.

daily by John C. Fremont in his trip up the Valley in 1844, and he was also struck by the "meagerness of the vegetation" and evidences that we now recognize as the signs of very heavy grazing. A. R. Mitchell in his book "King of Tulares" says "The Tulare (southern San Joaquin) Valley probably had more wild horses and mules than any other place of its size in the world." The Spanish authorities in the early 19th century ordered both horses and cattle slaughtered by the thousands to protect the ranges, but they could not control the natural increase. In drouth years cattle died of starvation after grazing the land bare, as many as 30,000 dying on a single ranch. Heavy storms often fell on the bare ranges, causing some of the gullies and barren spots we see today.

The following paragraphs and accompanying photographs are presented to show what one of the frequent San Joaquin storms does to land and to property, and to mention some methods of handling the watershed lands that are in line with the principles that govern run-off and therefore

Some of the Valley's floods originate in the foothills where heavy grazing has been the rule for generations. These gullied ranges are in the Tehachapi area, Kern County. They offer unmistakable proof of the depletion that has taken place since Father Francesco Garces first crossed these hills in 1775.

would, if generally used, decrease the violence, the volume, the soil and debris load, and the destructiveness of these floods.

The immediate cause of San Joaquin floods of February 1945 was a general warm rain in the Sierra Nevada Mountains. The highest recorded rainfall for February 1 to 3 was 14.93 inches at Grant Grove in Sequoia National Park. Foothill areas received about 4 to 6 inches and Fresno, in the center of the valley, 1.3 inches.

The effects of the storm were felt in many parts of the valley but were noted particularly in and around Visalia, a city of about 9,000 people and the county seat of Tulare County.

Visalia is located near the center of a large and rich delta or alluvial fan formation built up by the outwash from the Kaweah River and several other streams. The County in 1944 produced agricultural products to the almost incredible value of $148,998,405.

When the residents of Visalia went to bed the night of February 1 they knew that there had been a good soaking rain, but they were hardly prepared for a splash into cold, muddy water on the bedroom floor when they jumped out of bed the next morning. Water reached four feet deep in some sections of the city and a motorboat made regular trips through the lobby of the city's principal hotel to carry guests from the elevator to busses and trains. Farmers along the various channels that traverse the delta area and along Kings River farther north, saw gullies and holes washed in their vineyards and orchards. The General Grant Highway at Centerville was washed out by Kings River.

As yet there are no soil conservation districts on any of the sloping lands of the San Joaquin Valley's eleven large counties. But there are some cases that show what soil conservation practices can do for land, and therefore point the way to a type of land management that would undoubtedly have a beneficial though unmeasured effect in reducing floods.

For example, there are farmers who are coop-

erating with the Soil Conservation Service and Extension Service in carrying out cooperative demonstration farm plans. On the day that the Visalia people were moving their wet furniture into the attic, two of these ranchers were out in the rain with their shovels. They were P. L. Vaughn and Byron Rector of Squaw Valley above Visalia, in Fresno County—ranchers who had built miles of terraces and diversion ditches on their farms. They knew what a rain like that could do to a field. Said Rector, who has 1,280 acres, 217 of which are grain-hay land nearly all terraced, "Before I started on these terraces my fields were all cut up by gullies so that I had to farm every one of my fields in several little pieces. Now there are no gullies, not even from this 6-inch rain, except where one ditch broke."

This was the first real test these terraces had had. Vaughn who operates a 482-acre ranch with 158 acres of cropland stated: "My ditches carried the water easily. If we ever get heavier rains than this one I think they'll still carry the water off without any trouble. I had to build up only one

Byron Rector slowed run-off and stopped most topsoil loss by building 15,000 feet of terraces and diversion ditches on his Squaw Valley ranch.

levee with the shovel and plug a few gopher holes. I don't believe I lost any soil at all from the terraced wheat field this year."

But building terraces and diversion ditches is not the only thing that these cooperative rangers in the foothills are doing to hold the rainwater into the soil and hold it for crop growth.

Acting upon the results of their own experiences and the advice of Extension Service and Soil Conservation Service technical men, they are getting away from the old grain-summer-fallow system of farming and are working towards crops that build up the water-holding capacity of the soil. Vetch sown with the grain shows much promise as a builder of soil and a producer of more hay per acre, especially if fertilized with moderate amounts of low-cost phosphate fertilizer.

Vaughn and Rector are using specially made double disks that leave grain stubble on the surface to improve infiltration of moisture. On Sam Iriart's ranch in Kern County it was apparent after the February storms that his stubble mulched fields were almost free from erosion, whereas similar fields seeded on bare fallow land had not only lost many tons per acre of top soil but had shed so much water that terraces and gully dams were destroyed.

These men also recognize that good management builds up the water-absorbing ability of the hilly rangelands as well as enabling the range to produce more pounds of beef per acre. Their effort to conserve their cropland acres and build up their hay and grain production is largely with the idea in mind of making possible a conservative use of the range.

But does the work of these ranchers on their relatively insignificant acreage hold any promise as an alleviating factor in the flood problem? The answer is, undoubtedly, yes. We must recognize that when floods are controlled it will be as a result of a number of things: a few large undertakings; many, many small ones. Flood-control becomes useless if watersheds above them are not protected against the erosion debris that otherwise fills such reservoirs.

But every time a foothill rancher builds a stock-water dam to hold water or a terrace that makes the water "walk off" instead of "run off," or builds up the water-absorbing and water-holding ability of his cropland or range land by soil conservation practices, he holds back either water or water-borne soil and thereby makes the flood problem that much easier to solve.

He is entitled to a "thank you" from every townsman and farmer of the Valley's flood-threatened areas.

DISTRICTS *(Continued from page 8)*

2. They are independent. Their destinies are not controlled by outside influences, either State or Federal.

3. They exist for action. Their whole being is directed toward positive accomplishment.

4. Their work is founded on widespread local understanding. When farmers learn the facts about the land and agriculture in their district, they can agree on a united course of action and

(Continued on page 20)

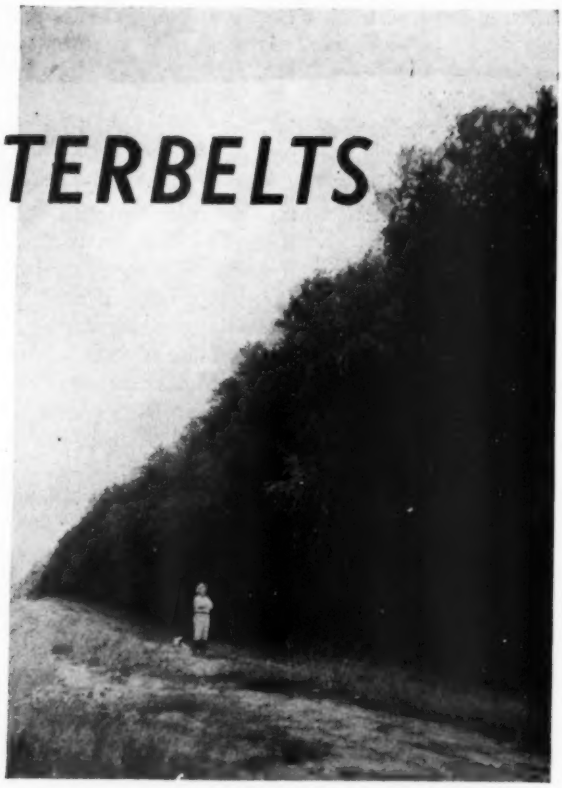
NARROW SHELTERBELTS for the Southern Great Plains

By JOSEPH H. STOECKELER

In the late summer of 1944, I had an opportunity to examine a number of shelterbelts in Oklahoma and Texas which were planted in the period 1935 to 1942, some by the Prairie States Forestry Project and several by the Lake States Forest Experiment Station. The latter were planted under my immediate supervision to determine the relative effectiveness of one-, two-, and three-row belts and to test several intensities of protection by varying the species and spacing between belts.

The plantings of particular interest were planted in the spring of 1935 in Beckham and Greer counties in southwestern Oklahoma, north of the city of Mangum. The average annual precipitation is about 26 inches per annum. The soil in the area is generally a Miles loamy fine sand or fine sandy loam, both subject to rather severe wind erosion unless properly managed. The crops are cotton and several types of grain sorghums such as kaffir and milo. The cotton yields are usually from ¼ to ½ bale per acre while the field crops produce from 15 to 30 bushels per acre. Although these yields are not high, the land is sufficiently productive so that it cannot be considered submarginal.

EDITOR'S NOTE.—The author is silviculturist, Lake States Forest Experiment Station, University Farm, St. Paul, Minn. Credit is due to Herbert Wells, forester with the Soil Conservation Service in Oklahoma and to E. N. Munns of the branch of research, Forest Service, Washington, D. C., for aid in the collection of field data and helpful suggestions on the organization of this article.



A 2-row 9-year-old shelterbelt of Chinese elm and cottonwood on Cleburn Thomas farm near Willow, Okla. Heights of species: 42 feet and 48 feet, respectively.

The outstanding features of the shelterbelts, now 9 years old, were their remarkable growth rate and their effectiveness in stabilizing the soil and reducing wind erosion. Most of them are from 30 to 48 feet high and form a dense and effective wind barrier. According to the owners, the belts had shown considerable benefit in reducing wind erosion when the trees were 5 years old, at which time they were 20 to 25 feet high.

The accompanying diagram shows the plan of shelterbelts on the 160-acre farm owned by Mr. Cleburn Thomas. In September 1944 he said "In the last few years the protection offered by these shelterbelts has solved the wind erosion problem on this farm." In brief, the plan provided for blocking out the farm into eight 20-acre tracts, each completely surrounded by shelterbelts, usually of 2 rows, and involving 2 species of widely different growth rate and form. Cottonwood was one species appearing in every belt. It was chosen because of its fast growth and adaptability to the deep friable sandy soils. The other species selected to flank the cottonwood in each belt was of slower

growth rate and was chosen on the theory that it would help to fill in the gaps that would appear in the lower part of the cottonwood, and which are caused by its well-known habit of shedding its lower limbs from 8 to 15 years after planting.

Since the most damaging winds in this section are from the south or southwest, the spacing between east-west shelterbelts was one-eighth mile, or 660 feet. Experimental evidence shows that actual crop influences and reduction of wind velocity and evaporation occur in substantial degrees out to at least 10 times the height of the trees; hence, with expected ultimate heights of 60 to 80 feet for the cottonwood, good protection at all points was expected from this gridwork of shelterbelts, once the trees had attained most of their height growth. (Unpublished data by the Lake States Forest Experiment Station, shows increased cotton yields of 30 pounds per acre in the protected zone of shelterbelts in Oklahoma and Texas.)

The following table lists pertinent data on the 8 individual half-mile shelterbelts on the Cleburn Thomas farm.

It is seen that of the 8 belts, 6 were rated good or very good, one fair, and one was very poor. Cottonwood in most belts had a survival of 60 to 90 percent. Mulberry, Chinese elm, honey locust and green ash generally had satisfactory survival. In belts numbered 3, 4, and 8 the partial or complete failure of one species was attributed to planting on a rather weedy ridge of sand built up in the fence rows on the property line and caused by wind erosion in past years. The sand ridges were 3 to 4 feet high and had rather poor moisture. Losses were accentuated by the severe drought in 1936 —the year of planting. The results of the planting in belt 4 constitute some argument for use of more than one row; even though the cottonwood failed, the more drought-hardy honey locust survived and grew well, making a rather effective shelterbelt by itself.

It is in the data on average height and spread that we note rather remarkable growth rates. In all belts except one, cottonwood averaged from 30 to 46 feet in height. They had average diameters of 5 to 9 inches and crown spreads of 18 to 30 feet. Next to cottonwood in growth rate were Chinese elm and honey locust which average 42 and 32 feet respectively. Of the other species, mulberry and green ash were the most successful as low-growing flanks for the cottonwood. The black walnut was rated low in vigor because of poor adaptability to the soil and inability to compete successfully with the adjoining row of cottonwood. The maximum heights of individual trees in belt 6 were 55 and 47 feet respectively for cottonwood and Chinese elm. Desert willow grown next to cottonwood was very lopsided in shape due to suppression, and ap-

Belt No.	Direction [1]	Success rating of belt [2]	Row No.	Species	Estimated survival (percent)	Average height in (feet)	Average spread crown (feet)	Vigor rating [2]
1	N–S	1	1	Desert willow [3]	60	8	6	3
			2	Cottonwood	90	38	20	1
			3	Mulberry	70	15	13	1
2	N–S	1	1	Green ash	90	16	10	1
			2	Cottonwood	90	40	25	1
3	N–S	5	1	Catalpa	3	12	10	2
			2	Cottonwood	0	..	..	..
4	E–W	2	1	Cottonwood	4	18	12	3
			2	Honey locust	95	32	22	1
5	E–W	1	1	Cottonwood	85	36	30	1
			2	Black walnut	15	5	5	4
6	E–W	1	1	Chinese elm [4]	90	42	22	1
			2	Cottonwood	90	48	24	1
7	E–W	1	1	Cottonwood	90	30	18	2
			2	Mulberry	95	20	16	1
8	E–W	3	1	Cottonwood	60	20	12	2
			2	Mulberry	10	8	6	2

1 N–S means North to South; E–W means East to West.
2 In the success and vigor rating scales: 1 = very good; 2 = good; 3 = fair; 4 = poor; 5 = very poor.
3 Desert willow was used as a replant for lilac which failed in 1936.
4 **Ulmus pumila**, usually called Chinese elm but sometimes known as Siberian elm.

Note density of lower half of crown in this 9-year-old shelterbelt of cottonwood and mulberry near Willow, Okla.

By contrast is the tendency to open up in lower half of crown in this 9-year-old shelterbelt of cottonwood only. As a wind barrier it is less effective.

parently it is too intolerant of shade to warrant its use in such a combination of species. Honey locust also shows a similar tendency to being partially suppressed, especially if planted on the north or east side of the cottonwood where light is rather poor.

Among the best two-row combinations seen in Oklahoma and Texas were cottonwood and mulberry, and cottonwood and Chinese elm. The first is a particularly effective combination when the mulberry is placed on the south or west side of cottonwood since here it is suppressed least from lack of light. It forms an effective screen against winds that tend to sweep through the lower half of the shelterbelt.

Several other three-row combinations that were highly effective were mulberry, Chinese elm, and Russian olive in one belt, and mulberry, Chinese elm, and green ash in a second belt. A three-row belt of mulberry, cottonwood and osage orange were a good combination seen in one Texas shelterbelt.

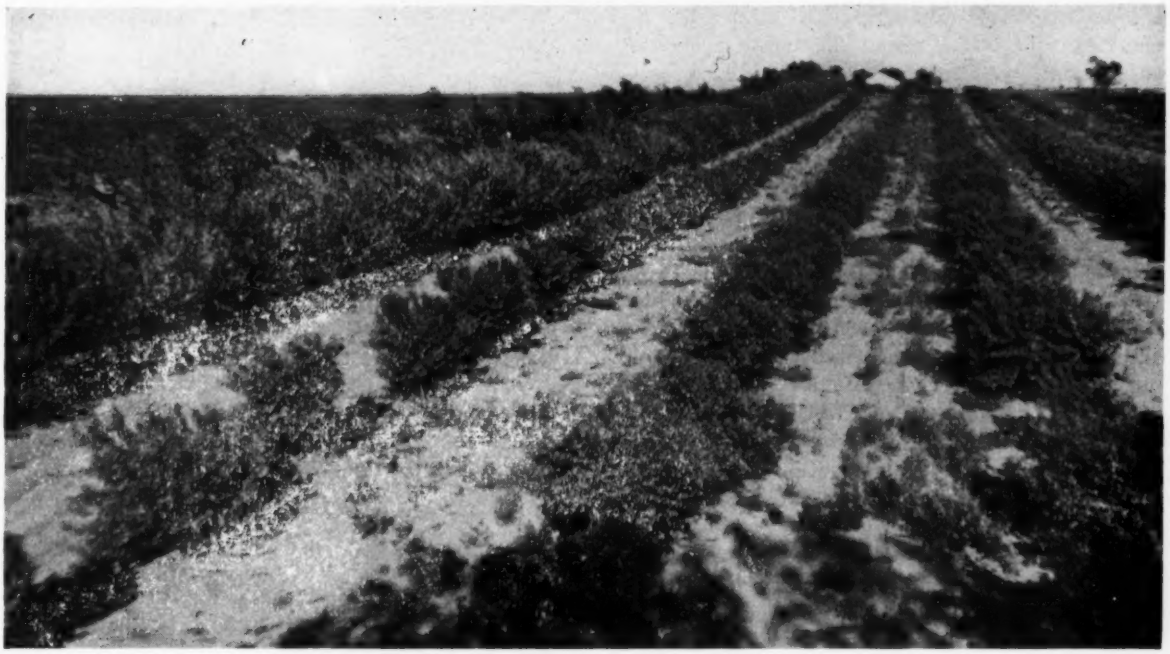
In another planting made on the nearby J. C. Thomas farm and comprising 11 shelterbelts of one-, two-, and three-row width, only one out of 20 rows failed. The other 19 ranged from 60 to 90 percent in survival and had growth rates equal to or exceeding those on the Cleburn Thomas farm.

The most interesting belt on this farm was a single row in which cottonwood and mulberry were alternated tree by tree. It made a very effective combination because of interlacing of the limbs into a two-storied pattern and was quite a contrast with a single row consisting only of cottonwood. In the latter the thinning out and dropping of the lower limbs had already begun to impair its value as a field shelterbelt. Where cotton-

These 7-year-old cottonwoods are 50 feet high. There is already a forest condition, with interlacing of crowns, leaf litter, absence of weeds or sod. Rube Bittner farm, Willbarger County, Tex.

wood and mulberry were alternated in the same row, the mulberry tends to develop an asymmetrical form in its horizontal cross-section of crown with dimensions of about 8 by 18 feet. This is merely an adjustment of the crowns to the growing space available and does not impair the value of the mulberry as an effective windbreak. Another very effective belt was a single row of mulberry which was 20 feet high at age 9 and made a dense wind screen. Such plantings, made at intervals of 300 to 400 feet, can be made to yield a

Six-year-old shelterbelts protecting cotton field on J. H. McDougal farm, Willbarger County, Tex.



A young orchard of peach, cherry and plum, with a 3-row 5-year-old shelterbelt at left. The Chinese elm is 18 feet high and the two flanking rows of mulberry are 12 feet high. Ira L. Tucker farm near Paducah, Tex.

continuous crop of fence posts without impairing their value as shelterbelts by merely cutting out some of the larger stems. The cut stems promptly sprout up and make the tree even more bushy and leafy. Some farmers in this area use this very system of modified "coppicing" on their older mulberry hedges to obtain posts.

On a third experimental planting made on the J. W. Means farm near Willow, Okla., an effective combination of species consisted of one row of mulberry on the west or south side of two rows of cottonwood. Heights at age 9 were 15 feet for the mulberry and 35 feet for the cottonwood.

Several shelterbelt enthusiasts were encountered who had specific comments to make on crop influences. One of these, Rube Bittner, who farms near Vernon, Tex., said that in 1944 he obtained a return of $1,200 on 9 acres of watermelons grown in protection of shelterbelts. On a nearby farm a neighbor with similar soil but no shelterbelts required 20 acres to produce the same gross revenue.

Mr. Ira Tucker in Cottle County, Tex., has a

This 10-year-old shortleaf pine is 18 feet high. The belt is in Greer County, Okla.

rather elaborate set of shelterbelts mostly of 3 to 7 rows and has a young orchard of peaches and cherries. He said "Without shelterbelt protection, satisfactory fruit can not be produced in this section of Texas. I would sooner have 100 acres of farm with shelterbelts than 150 acres without."

Of course, the success of any shelterbelt planting depends upon the farmer. He has the vitally important job of cultivation of the trees for 4 to 6 years after planting or until such a period as the crowns begin to close or are near closure. This cultivation is by far his most important contribution to the success of the planting. It needs to be done annually 4 to 5 times the first 2 years after planting and 3 to 4 times per year for the following 2 to 4 years. The outside of the belt should preferably be kept reasonably free of weeds for the entire life of the belt even after there is stand closure. A few diskings or cultivations per year will suffice. Very often the cultivation or operation of equipment on turn rows is sufficient. Protection from livestock damage is a further essential detail that is the responsibility of the farmer.

In conclusion it can be said that, in those parts of western Oklahoma and northern Texas where rainfall is about 24 to 26 inches per annum, results of experimental planting and data on crop response tend to favor planting of rather narrow shelterbelts of one to four rows on the most favorable of the sandy sites where intertilled crops are grown and where wind erosion is a problem. An interval between the east-west belts of ⅛ mile and of ¼ mile between north-south belts gives adequate protection to crop land if the tall-growing trees are of a type that will attain ultimate heights of 60 to 80 feet. Where they attain heights of only 20 to 30 feet, the interval between east-west belts should be cut to about 1/16 mile.

The alternation in a single-row belt of two species of widely different growth habit and form, such as cottonwood and mulberry, proved to be quite successful, and introduces a new principle in shelterbelt planting that has not been used to any extent in prairie planting. It may have wider application with other combinations of species in other sections of the country.

A right-angle view of the planting seen in the picture introducing this article.

IT'S AN ILL WIND (*Continued from page* 10)
technicians indicated that installation of a sprinkler system and other improvements will increase this irrigable area to seven acres. Some of this increase will result from more efficient use of water, some from a more effective diversion and delivery system, and some from a minimum of wastage as the water is applied to the land. Soil and water losses will be negligible.

The two rangeland practices prompted by that 1937 "chinook"—erosion control and forage production obtained through reseeding and contour furrowing on the one hand, and through range management on the other—plus erosion control on the orchard and the additional acreage that can be irrigated, combine to spell better farming for the George Davises.

DISTRICTS (*Continued from page* 15)
carry it out with every reasonable prospect of widespread satisfaction. Moreover, districts usually bring together as supervisors, by popular election, the leading farmers or landowners of the

(*Continued on page* 22)

THEY HELP MAP THE VICTORY

Scattered to the four corners of the earth are nearly 3,000 former employees of the Soil Conservation Service now in the armed forces of the United States. They fight on land, on sea, and in the air—some in front lines, others farther back. All are giving a good account of themselves.

Recently came to Washington a letter and picture from Sergeant Eloi Primeaux, who served the Soil Conservation Service as an assistant soil conservationist in Lafayette, La. The picture, taken on the island of Oahu, Territory of Hawaii, shows soldiers of the 30th Engineer Topographic Battalion, which served a hitch in the European theater of operation (ETO) in 1943-44 before being transferred as a unit to the Pacific theater. Our readers will recognize many of these husky lads as outstanding technicians in the soil conservation program.

Front row: William S. Metcalf, agricultural aide, Beltsville, Md.; H. F. McNeill, engineering draftsman, Spartanburg, S. C.; James L. Gray, assistant soil scientist, Mansfield, La.; Raymond V. Leighty, assistant soil scientist; Conyers, Ga.; J. Y. Oakes, associate soil scientist, Tyler, Texas; James R. Moore, assistant soil scientist, Graceville, Fla.; Charles A. Williams, soil surveyor, Clarksville, Ark.; Arnold A. Knecht, Jr., soil scientist, Freeport, Ill.; Eloi Primeaux, assistant soil conservationist, Opelousas, Ia.; Ralph J. Monty, Jr., soil scientist, Fairfield, Iowa.

Back row: John C. Cord, soil conservationist, Mott, N. D.; L. Cyril Higginson, assistant soil conservationist, Colorado Springs, Colo.; George Whiting, engineering aide, Beltsville, Md.; Joe Crown, topographic draftsman, Beltsville, Md.; S. Jack Friedman, Jr., cartographic engineer, Beltsville, Md.; Merton R. Chesley, Jr., civil engineer, Ellensburg, Washington; N. Talmage Nelson, assistant range conservationst, Yakima, Wash.

SOIL CONSERVATION SERVICE EMPLOYEES KILLED WHILE ON MILITARY FURLOUGH

Name	Date of Death
Bond, Alfred D.	June 2, 1944
Brown, Noel A.	February 5, 1942
Buoy, Chester L., Jr.	December 22, 1942
Burgess, Robert E.	February 20, 1944
Butler, Horace F.	February 29, 1944
Carlson, Selway C.	August 5, 1944
Coleman, Gerald D.	June 25, 1944
Crow, Perry E.	January 14, 1945
Deflinger, James Ralfe	June 7, 1944
Eberle, William, Jr.	July 12, 1944
Elliott, James F.	June 5, 1944
Engholm, John W. R.	July 25, 1944
Espinosa, Delfin G.	January 21, 1945
Ferril, Wilburn H.	October 11, 1944
Forrest, Bedford H.	November 26, 1944
Foster, Glenn E.	April 11, 1944
Fraker, Richard A.	November 1, 1944
Gandy, John E., Jr.	December 9, 1943
Gleason, Paul J.	November 22, 1944
Harrison, Ashley	July 14, 1943
Hawk, Ira A.	July 23, 1944
Hirt, Peter, Jr.	August 28, 1943
Hurd, Layton B.	December 28, 1944
Irby, Francis M.	January 27, 1945
Keathley, George D.	September 14, 1944
Knuer, Otto E.	July 19, 1942
Lane, Robert A.	August 23, 1944
Leonhardt, Henry Lewis	December 17, 1943
Lines, William	May 21, 1944
Loyd, William S.	December 27, 1944
Lunt, George A.	August 25, 1942
Mickler, Marvin F.	March 10, 1944
Mobley, James D.	September 9, 1943
Moore, Alfred M.	May 8, 1944
McCorkle, Capt. J. Ray	January 30, 1942
McKesson, Elmer L.	July 12, 1944
Neely, Thomas W.	June 7, 1944
Neumann, Wesley John	July 26, 1944
Nichols, Roy A.	June 4. 1943
Noblitt, William G.	February 10, 1944
Oppenheim, James R.	July 1, 1944
Park, Robert S.	September 19, 1941
Parkins, Judson Harlow	Spring 1944
Ripley, Raymond G.	February 10, 1945
Rountree, James E.	July 14, 1944
Saucier, Henry Quitman	April 28, 1944
Scott, Elbert D.	August 8, 1944
Shelton, Frederick E.	October 8, 1944
Shirley, Basil	June 17, 1944
Simons, John A., Lt.	January 26, 1943
Smith, Franklin J.	December 2, 1944
Smith, Gilmer P.	May 31, 1944
Smith, Lionel F.	June 6, 1944
Spofford, Gerald E.	January 30, 1944
Stark, Nance D.	March 9, 1943
Thompson, Loren E.	July 24, 1943
Verner, Lemuel H.	September 9, 1944
Walker, Neal H.	October 27, 1944
Wayland, Clifford H.	May 11, 1943
Wilmeth, Lillard G.	February 11, 1945
Woolbright, Charles J.	October 1, 1944
Wustrack, Robert R.	March 19, 1944

DISTRICTS *(Continued from page 20)*
district, from different communities, with the result that some of the best thinking in each community is regularly interchanged with that of neighboring communities.

5. They are definite organizations that are able to plan programs, obtain information, procure governmental and other services, and do many other things that the same farmers as individuals, working alone, would not have been able to do.

6. They provide a recognized centering point and clearing house in the locality for carrying forward advanced agricultural programs and developments in general, from weed-control campaign to group drainage project, as they are in the best interests of soil and water conservation and proper land use.

7. They provide a practical medium through which the encouragement, influence and assistance of local business and professional interests can be brought to bear in an effective, constructive way for the benefit of agriculture in the district.

8. They are in a position to provide helpful local guidance, responsive to the needs and desires of the local people, to such professional workers as the county agent, soil conservation technician, forester, and highway engineer.

REFERENCE LIST ☆☆

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[1] From the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.

NATIONAL FARM-SAFETY WEEK 1945

BY THE PRESIDENT OF THE UNITED STATES OF AMERICA

A PROCLAMATION

WHEREAS the Nation recognizes that the skill and labor of its farmers is a vital factor in winning the war, and the production of food one of the most essential means of winning the peace; and

WHEREAS the inevitable decrease in available farm labor this year creates an especially urgent need for conserving farm manpower to meet production goals in 1945; and

WHEREAS the accidents which cause some fourteen hundred farm residents to lose their lives each month, and one hundred and twenty-five thousand others to suffer injuries, constitute an unnecessary waste of human life as well as of time and material:

NOW, THEREFORE, I, HARRY S. TRUMAN, President of the United States of America, do hereby call upon the Nation to observe the week commencing July 22, 1945, as National Farm-Safety Week. And I request all persons and organizations concerned with agriculture and farm life to do everything in their power to educate farm people in the proper precautions by which they may eliminate farm hazards, and to stimulate a nationwide determination to stop the needless waste of irreplaceable farm manpower and property. And I further urge that farm people everywhere observe National Farm-Safety Week by making a safety check in their homes and on their farms.

IN WITNESS WHEREOF, I have hereunto set my hand and caused the seal of the United States of America to be affixed.

DONE at the City of Washington this ninth day of May, in the year of our Lord nineteen hundred and forty-five, and of the Independence of the United States of America the one hundred and sixty-ninth.

By the President:

HARRY S. TRUMAN
(Signed)

Joseph C. Grew
Acting Secretary of State